Date Planned : __ / __ / __	Daily Tutorial Sheet-6	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level-2	Exact Duration :_____

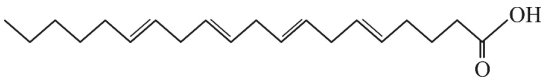
76. $Mg(s) + 2HCl(aq) \longrightarrow MgCl_2(aq) + H_2(g);\ \Delta_r H^o = -467 kJ/mol$

$MgO(s) + 2HCl(aq) \longrightarrow MgCl_2(aq) + H_2O(\ell);\ \Delta_r H^o = -151\ kJ/mol$ w

According to the information, and given the fact that for water, $\Delta_f H^o = -286$ kJ/mol, what is the $\Delta_f H^o$ for MgO(s)?

(A) −904 kJ/mol **(B)** −602 kJ/mol **(C)** −334 kJ/mol **(D)** −30 kJ/mol

77. The heat required to sustain animals to hibernate, comes from the biochemical oxidation of fatty acids:



$+ O_2(g) \longrightarrow CO_2(g) + H_2O(\ell)$

Its standard molar enthalpy of formation is – 636 kJ mol^{-1}.

$C(s) + O_2(g) \longrightarrow CO_2(g) \qquad \Delta_r H^o = -393.5$ kJ/mol

$2H_2(g) + O_2(g) \longrightarrow 2H_2O(\ell) \qquad \Delta_r H^o = -571.6$ kJ/mol

Calculate the mass of arachidonic acid needed to warm a 500 kg bear from 5^oC to 25^oC. Assume that the average heat capacity of bear flesh is 4.18 $Jg^{-1}\ K^{-1}$.

(A) 108 g **(B)** 300 g

(C) 1.08 kg **(D)** 540 g

78. Given the experimental information below:

$2Sr(s) + O_2(g) \longrightarrow 2\,SrO(s); \qquad \Delta_r H^o = -1180$ kJ/mol

$SrCO_3(s) \longrightarrow CO_2(g) + SrO(s); \ \Delta_r H^o = 234$ kJ/mol

$2O_2(g) + 2C(s) \longrightarrow 2CO_2(g); \qquad \Delta_r H^o = -788$ kJ/mol

Calculate the enthalpy change $\Delta_r H^o$ for the formation of 1.0 mol of strontium carbonate, the material that gives red color in fireworks, from its elements.

$$Sr(s) + \frac{3}{2}O_2(g) + C(\text{graphite}) \longrightarrow SrCO_3(s)$$

(A) −740 kJ/mol **(B)** +714 kJ/mol

(C) −1218 kJ/mol **(D)** −2436 kJ/mol

79. Which is the heat of reaction for the following reaction:

$CH_4(g) + NH_3(g) \longrightarrow 3H_2(g) + HCN(g)$

Use the following thermodynamic data in kJ/mol.

$N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g);\ \Delta_r H° = -91.8$

$C(s) + 2H_2(g) \longrightarrow CH_4(g);\ \Delta_r H° = +74.9$

$H_2(g) + 2C(s) + N_2(g) \longrightarrow 2\,HCN(g);\ \Delta_r H° = 261.0$

(A) 299.3 kJ **(B)** 256.0 kJ **(C)** −149.5 kJ **(D)** 101.5 kJ

80. 25.0 mL of 1.0M HCl is combined with 35.0 mL of 0.5 M NaOH. The initial temperatures of the solutions is 25^oC, the density of the solution is 1.0 g/mL, the specific heat capacity of the solution is 4.184 J/g °C, the reaction is completed in insulated beaker, and the standard enthalpy of reaction for $H^+(aq) + OH^-(aq) \longrightarrow H_2O(\ell)$ is –56 kJ/mol . What is the final temperature of the solution?

(A) 27^oC **(B)** 28.9^oC **(C)** 30.1^oC **(D)** 32.8^oC

81. The reaction $3O_2(g) \longrightarrow 2O_3(g)$; $\Delta_rH > 0$. What can be concluded about average energy per bond in O_2 and O_3 ?

(A) The average energy per bond in O_2 is greater than the average bond energy per bond in O_3 **(B)** The average energy per bond in O_2 is less than the average energy per bond in O_3

(C) The average energy per bond in O_2 is same as average energy per bond in O_3

(D) No conclusion can be drawn about the average bond energies from this information alone

***82.** When 5.0 mL of a 1.0 M HCl solution is mixed with 5.0 mL of a 0.1 M NaOH solution, temperature of solution is increased by 2°C predicted accurately from this observation?

(A) If 10 mL of same HCl is mixed with 10 mL of same NaOH, temperature rise will be 4^oC

(B) If 10 mL of 0.05 HCl is mixed with 10 mL of 0.05 M NaCl the temperature rise will be 2^oC

(C) If 5 mL of 0.1 M HCl is mixed with 5 mL of 0.1 M NH_3 solution, the temperature rise will be less than 2^oC

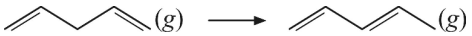
(D) If 5 mL 0.1 M CH_3COOH is mixed with 5 mL of 0.1 M NaOH, the temperature rise will be less than 2^oC

***83.** Which of the following reactions doesn't represent the standard state enthalpy of formation reaction?

(A) $\frac{1}{2}H_2(g) + \frac{1}{2}Cl_2(g) \longrightarrow HCl(g)$ **(B)** $CO(g) + \frac{1}{2}O_2(g) \longrightarrow CO_2(g)$

(C) $N_2(g) + \frac{1}{2}O_2(g) \longrightarrow N_2O(g)$ **(D)** $Na^+(g) + Cl^-(aq) \longrightarrow NaCl(s)$

***84.** Consider the following isomerization process:



What can be predicted accurately for this process?

(A) The process is exothermic

(B) Enthalpy change of reaction $(\Delta_rH°)$ = Resonance enthalpy of product

(C) enthalpy of combustion $(\Delta_cH°)$ of product is less than that of reactant

(D) Combustion of the reactant will be exothermic while the same of products will be endothermic

***85.** α – maltose can be hydrolysed to glucose according to the following reaction:

$\alpha - C_{12}H_{22}O_{11}(aq) + H_2O(\ell) \longrightarrow 2C_6H_{12}O_6(aq)$

Given standard enthalpy of formation of $H_2O(\ell)$, $C_6H_{12}O_6(aq)$ and $C_{12}H_{22}O_{11}$ are –285, –1263 and –2238 kJ/mol respectively. Which of the following statements is (are) true?

(A) The hydrolysis reaction is exothermic

(B) Heat liberated in combustion of 1.0 mol of α – maltose is greater than the heat liberated in combustion of 2.0 mole of glucose

(C) Increasing temperature will increase the degree of hydrolysis of α – maltose

(D) Enthalpy of reaction will remain same even if solid α – maltose is taken in the reaction